XI. "On the Properties of Electro-deposited Antimony" (continued). By GEORGE GORE, Esq. Communicated by Dr. TYNDALL. Received June 1, 1858.

(Abstract.)

In this paper the following additional information is given respecting this singular substance.

The change observed in it is shown not to be an exercise of the force of cohesion, because the amount of heat evolved by the powdered metal is not sensibly different from that set free by the substance in its coherent massive state.

The thermic discharge is not limited to a particular temperature, but commences between 170° and 190° Fahr., and increases in rapidity to some point above 212° Fahr., when it becomes sudden.

The heat may be discharged either suddenly or gradually, according to the amount to be discharged in relation to the amount of cooling influences present.

The specific heat of the unchanged metal was found to be= 0·06312; and of the same specimens, after being *gradually* discharged, the specific heat was not sensibly different. But the specific heat of the substance, after *sudden* discharge, was found to be=0·0543.

The total amount of heat evolved by the substance during its change was sufficient to raise the temperature of its own weight of ordinary antimony (sp. heat=0·0508) about 650° Fahr.

The evolution of vapour which generally occurs during the change is a result of the molecular heat acting upon the terchloride of antimony contained in the substance. It occurs when a sufficient temperature is produced either by internal or external causes, and does not occur when the molecular discharge is gradual and the temperature is not sufficiently raised; in such cases the weight of the substance remains unaltered.

The substance, as usually produced from ordinary muriate of antimony, or from a mixture of that substance and tartar-emetic, contains small quantities of nearly all the ingredients and impurities of the depositing liquid.

The pure substance deposited upon sheets of platinum, in a solution of pure hydrochloric acid three-fourths saturated with pure

oxide of antimony, with an anode of pure antimony, exhibited no material difference in properties from the less pure variety.

Two analyses of the pure unchanged substance gave the following per-centages :—

No. 1.			No. 2.		
Sb	93·36		Sb	93·51	
$SbCl^3$ ...	5·98	} = 6·44	$SbCl^3$ ...	6·03	} = 6·24
HCl.....	0·46		HCl.....	0·21	
	99·80			99·75	

A trace of water contained in them was not estimated.

Solvents removed the chloride of antimony from the powdered substance much more readily *after* the thermic discharge than *before* it.

Differences of physical appearance were detected in the changed and unchanged substance in the state of powder under a microscope ; the surfaces of the latter were *smooth* and brilliant, whilst those of the former were *granular* and less bright. No mechanical mixture could be detected in the changed powder.

From the various experiments detailed in the paper, it appears that the substance in question is a feeble chemical compound of antimony and acid hydrochlorate of terchloride of antimony, apparently in variable proportions, decomposable by heat, and that the change observed in it, in cases of *gradual* discharge, consists of a molecular alteration, attended by weakened chemical affinity, and by evolution of heat ; but in cases of *sudden* discharge the evolved heat produces a partial chemical decomposition, which is of greater or less extent, according to the temperature acquired.

A portion of the powdered unchanged substance, digested sixty-three days with an aqueous solution of caustic potash, lost 2·95 per cent. in weight, but still retained about $\frac{3}{4}$ths of its heating power. A second portion, digested fifty-six days with strong hydrochloric acid, lost 6·66 per cent. and all its heating power.

Exposure to light did not destroy the heating power of the powdered substance.

By depositing the grey variety of antimony into mercury, a pasty compound of the two metals was formed. The amorphous variety did not combine with mercury under similar circumstances.

An acid solution of fluoride of antimony yielded by electro-deposition grey crystalline antimony not possessing the heating power.